

COMPARATIVE ASSESSMENT OF THE NUTRITIONAL STATUS  
OF HAITIAN CHILDREN DURING THE TRANSITIONAL PERIOD  
IN TWO HAITIAN COMMUNITIES

by

Ma. Stella Gonzales

Thesis submitted to the Graduate Faculty of the  
Virginia Polytechnic Institute and State University  
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

Human Nutrition and Foods

APPROVED:

---

R. E. Webb, Chairman

---

R. W. Engel

---

J. A. Ballweg

---

C. L. Miranda

---

S. S. Ward

February, 1975  
Blacksburg, Virginia

## ACKNOWLEDGEMENTS

The author wishes to express her deep appreciation to  
for their guidance, encouragement and technical assistance. Special thanks are given to  
Director of Haitian Bureau  
of Nutrition. The help and encouragement of numerous friends are sincerely appreciated.

## TABLE OF CONTENTS

Acknowledgments	ii
List of Tables	v
List of Figures	vi
Introduction	1
Theoretical Framework and Review of the Literature	4
The Ecosystem Approach	4
Maternal Diet in Puerperium	9
Breastfeeding and Weaning Habits	11
Transition Period Diet	14
Methodology	19
Sampling Procedure	19
Village Selection	19
Village Description	19
Respondents	23
The Instrument	23
Anthropometry	24
Weight	24
Height	24
The Survey Team	25
Sight of Field Examination and Line of Flow	25
Definition of Major Terms	26
Scope and Limitations of the Study	27
Results and Discussion	28
Maternal and Family Characteristics	28
Characteristics of the Child	33
Additional Observations	38
Summary and Conclusions	42
Literature Cited	44
Appendix 1	48

Appendix II	59
Appendix III	60
Appendix IV	61
Appendix V	62
Vita	63

## LIST OF TABLES

Table		Page
1.	Age of Mother in Relation to the Nutritional Status of the Child.	29
2.	Literacy Level of Mother in Relation to the Nutritional Status of the Child.	30
3.	Distribution of Children According to Number of Siblings and Nutritional Status.	32
4.	Distribution of Children According to Age in Months and Nutritional Status.	34
5.	Distribution of Children According to Sex and Nutritional Status.	35
6.	Distribution of Children According to Type of Infant Feeding (Milk) and Nutritional Status.	36
7.	Distribution of Children According to Age at First Introduction of Semi-solid Food and Nutritional Status.	37
8.	Distribution of Children According to Weaning Practice and Nutritional Status.	39

## LIST OF FIGURES

Figure		Page
I.	A Conceptual Model for the Study of Nutritional Status of Children.	5
II.	The Family as Environment	7
III.	Nutrient Intake of the Child	8

## INTRODUCTION

Nutrition is an emerging dynamic science concerned with man in health and disease, multidisciplinary in scope and holistic in approach. The important link between diet, skilled manpower and productivity potential has led to an increasing awareness of nutritional adequacy as important to both the health of the people and a requirement for development and public policy. In essence, the problem of malnutrition challenges the economic growth of developing nations.

It has been documented that the pre-school child is at the vulnerable age in human development (Gyorgy, 1970). By necessity young children are dependent on others, primarily members of the family. Provision for nutrient supply, emotional support and intellectual stimulation is essentially a family affair. Cultural practices and values transmitted through close association with the family largely influence the pattern of growth and development of the child.

According to Jelliffe (1966):

The situational background of poor economic condition, high illiteracy level and minimal socio-medical facilities provide fertile ground for attitudes, customs and prejudices to exert great significance.

It is therefore, evident that new nutritional knowledge pertinent to peasant economics is needed.

Confronted with a comparable situation and cognizant of its limited resources, the Haitian government, like other developing countries, has instituted several measures to combat its nutritional problems.

Several studies have noted the deficiencies in the Haitian diet

(see King et al (1968), Jelliffe and Jelliffe (1961), Sebrell et al, (1959) and Grant and Groom (1952). Fougere (1968) reported that 68% of Haitian pre-school children were suffering from malnutrition of one degree or another and approximately 7% suffered from kwashiorkor. Extending Jelliffe's findings on 1,322 pre-school children to the entire Haitian pre-school population, Fougere estimated that 255,830 individuals were undernourished and 26,336 suffered from kwashiorkor.

The 1972 census figure for Haiti (Population Progress Assistance, 1972) included an estimated population of 5,021,000 (Jan. 1, 1972); a birth rate per 1,000 and death rate per 1,000 of 44 and 18 respectively. The infant death rate in 1970 was reported to be 130 per 1,000. Percentage literacy was 10, while there was a 2.6% rate of natural increase.

The poor agricultural economy, seasonal variations and the old traditional beliefs in child feeding practices have been considered major factors contributing to the prevalence of malnutrition (Jelliffe and Jelliffe, 1961).

The study reported here encompasses the following objectives:

1. To ascertain the prevailing child feeding patterns, weaning habits, beliefs and practices during pregnancy and lactation of mothers in the Haitian villages of St. Michael and Lalomas. Efforts were directed specifically toward determining:

- (a.) the type of infant feeding (milk) in each community
- (b.) the duration of lactation (breastfeeding) and other forms of milk feeding (bottle and mixed).
- (c.) age at introduction of first semi-solid.

- (d.) qualitative characteristics of the transitional diet.
- (e.) food beliefs and practices during pregnancy and lactation.
- (f.) attitudes of mothers regarding scientific prenatal care.
- (g.) mother's concept of illness in relation to weaning.

2. To explore the relevant associations between demographic variables such as family composition (number of siblings) and maternal characteristics (age, literacy level, occupation), and the nutritional status of the sample population.

3. To determine the impact on the community of the mothercraft center (nutrition education program) measured in terms of the nutritional health of the sample children. This impact will be approximated via a comparative analysis of the nutritional status of the participant (sample) children in each community based on anthropometric measurements such as weight, height, head and chest circumference, mid-arm circumference, and skinfold thickness.

From the above it can be seen that this study attempts to explore the association between feeding pattern and nutritional status of the participant children.

## THEORETICAL FRAMEWORK AND REVIEW OF THE LITERATURE

Sims (1970) contends that:

The syndrome of malnutrition occurs not in isolation but consists of an entire constellation of environmental factors which together contribute to final manifestation of the problem. Nutrient intake has been recognized as an important environmental factor which acts upon the genetic potential of the child to influence his growth and development.

Additionally, Sims et al (1972) acknowledge Johnson's statement that:

"the study of nutrition is a study of ecology and for valid assessment the whole of the environment must be examined." Within this context, the present research focuses on the Ecosystem Approach as the ecological model most appropriate for the study of the nutritional status of the pre-school child in relation to the home and family environment.

(Figure 1)

In classical terms, ecology is the science of the relationship between an organism and its environment. A system is a set of components which act with one another to bring about a balance, interdependence or wholeness. (Havelock, 1971).

The Ecosystem Approach - The salient characteristic of the ecosystem framework considers the living system as composed of matter and energy organized by informations (Miller, 1971). Hanlon (1969) suggested that:

Man is an open system through which the energy, resources, and influences of the environment are transformed for good or ill, and which transforms man in the process.

The matter-energy flow related to the provision of food from the environment, is utilized by the organism and manifested in an

A CONCEPTUAL MODEL FOR THE STUDY OF NUTRITIONAL STATUS OF CHILDREN

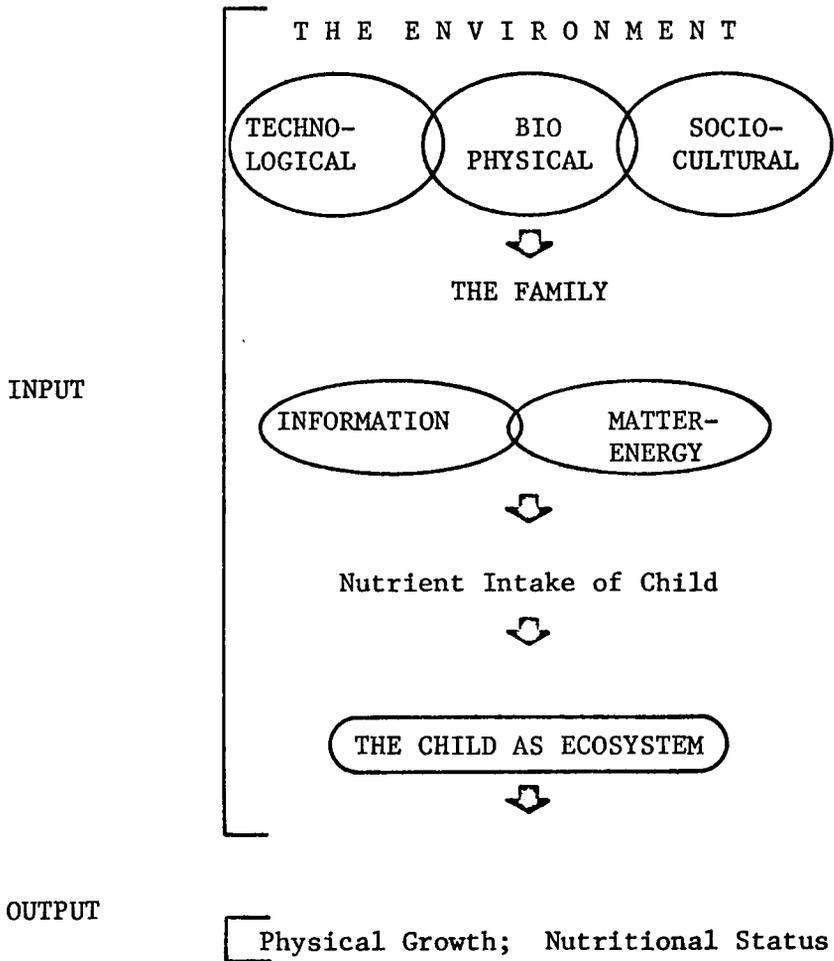


Figure I.

output of energy needed to carry out growth and maintain life. The information flow within the system is appropriately illustrated by the "wheel communication network." In this model, the mother in a nuclear family represents the major link between the outside environment and other members of the family, being responsible for the preparation and distribution of nutritional energy (food) within the household (Katz and Kahn, 1966). (see Figure II.)

For the effective utilization of the systems approach, it is necessary that the environmental factors impinging upon the system be identified. According to Rafalski and Mackiewicz (1968) man distinguishes two types of environment: the physical and biological, which are independent of man, and the social, cultural and economic features of the environment which are closely associated with human existence.

Two system definitions are considered in this conceptual framework, the family as an ecosystem and the child as an independent ecosystem. The first system is based on the premise that the family plays the key role in providing the child with the environment through which matter-energy and information are transmitted and resources are utilized to enable him to meet his growth potential.

The second system (the child as an independent ecosystem) was developed as an extension of the general ecosystem approach to studying the nutritional status of the pre-school child. Sims (1970) postulated that the nutrient intake of the child represented the most significant linkage between the family system output and the child's nutritional status. (see Figure III.) Jessor and Richardson (1968)

## THE FAMILY AS ENVIRONMENT

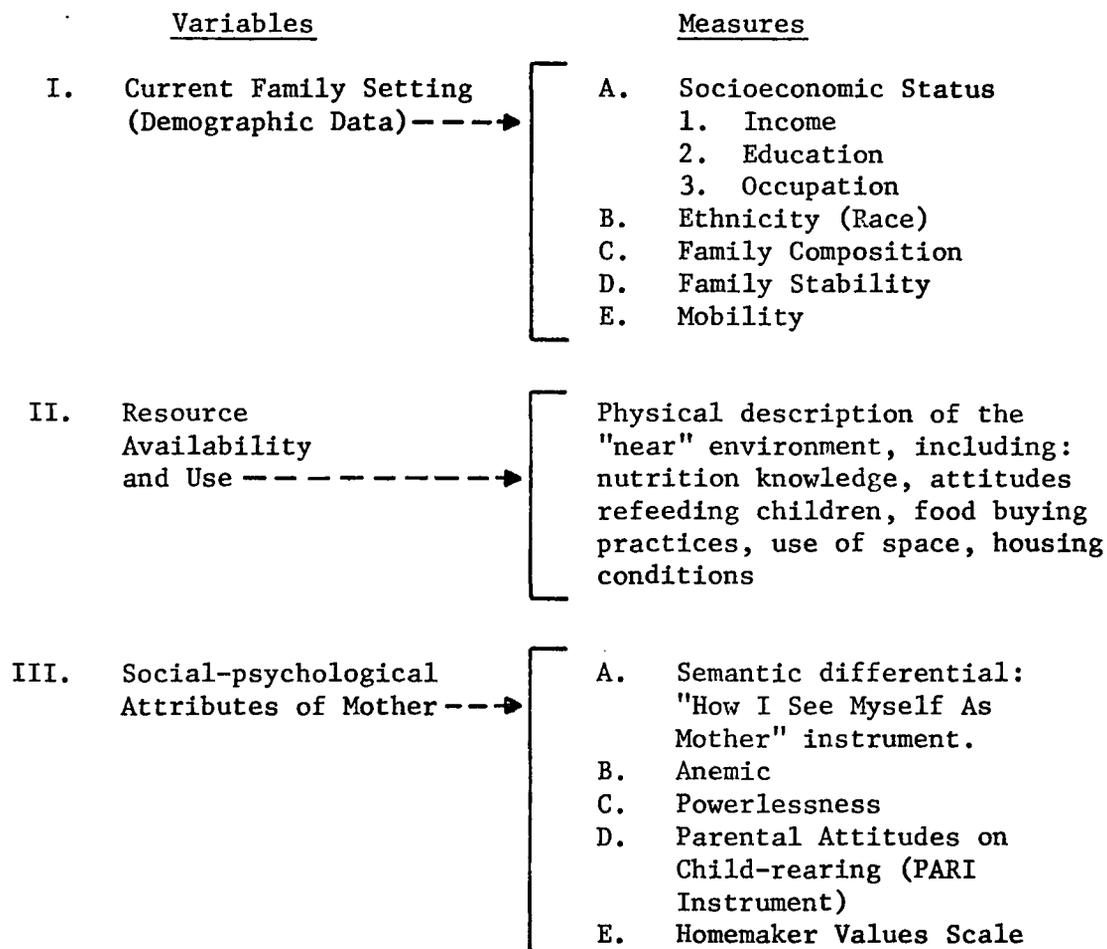


Figure II.

## NUTRIENT INTAKE OF THE CHILD

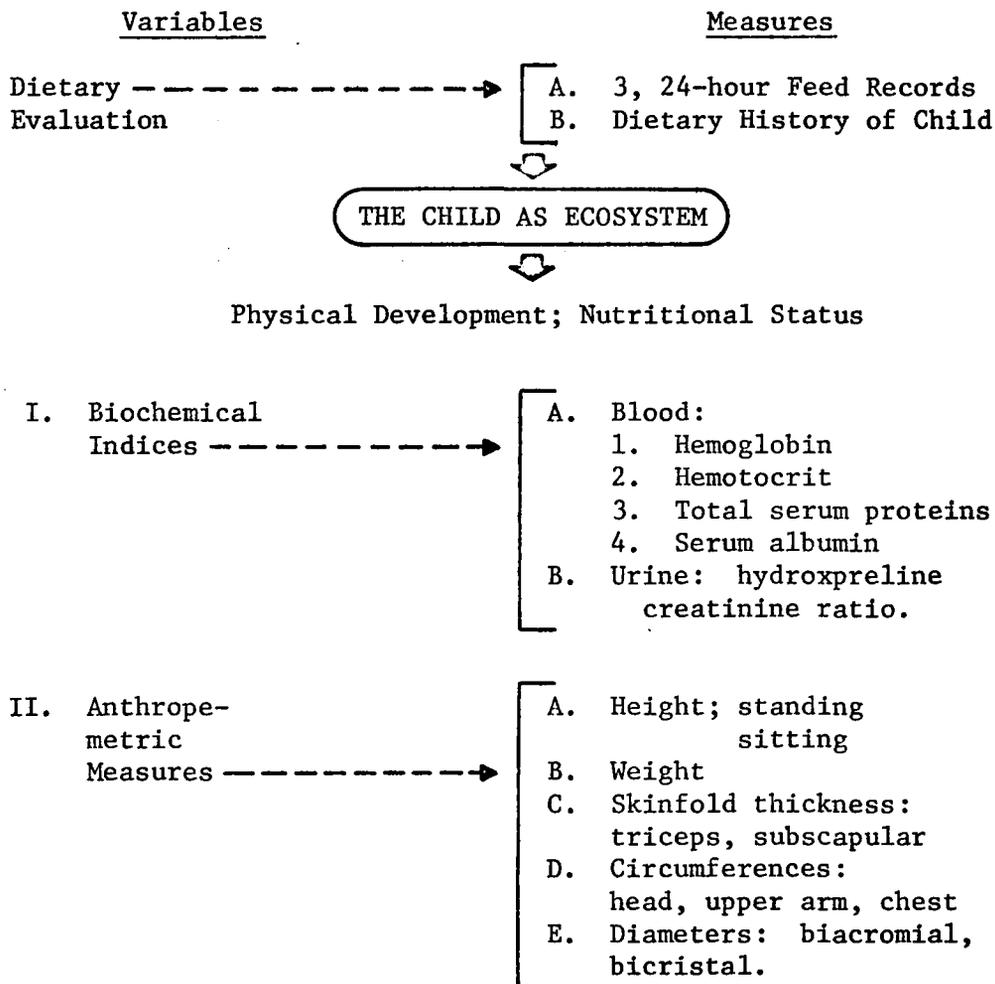


Figure III.

indicate that demographic variables (including race, economic status, family composition, maternal characteristics, age, education, occupation) have been included, since these factors influence food habits and consequent food intake of the pre-school child.

Nutritional anthropometry has been utilized in the present study to measure physical variation and different levels of nutrition relevant to the variables under consideration. The growth rate of children has been cited as one of the most simple, inexpensive, reliable and important tools by which to assess nutritional status (Food and Nutrition Board, 1956).

Prior to an in-depth examination of the procedures adopted in carrying out this study it is first necessary to review the research which has been conducted in related areas. Specifically, the literature concerned with maternal diet in puerperium, and other related topics will be examined.

#### Maternal Diet in Puerperium.

In a report by Jelliffe (1962), mothers in Guatemala were given broth from chicken or beef after delivery or during lactation to provide strength and promote milk secretion. Among the Bagandas in Africa, good protein foods (meat and eggs) were tabooed from the mother's diet. Food was restricted for forty days following delivery among Chinese mothers in Singapore as well. These special dietary practices during puerperium were classified by Jelliffee as either nutritionally beneficial or harmful.

In a study of infant feeding in a small Filipino village, Nurge

(1957) found no change in the meal pattern of the mothers during pregnancy. However, during lactation practices to enhance abundant milk flow were encouraged. Broth from clams, fish, vegetables, chicken and beef were considered good galactagogues.

As practicing physician in Mandalay, Burma, Sharma (1955) observed that the major cause of high infant mortality was beri-beri, due to a diet consisting mainly of large quantities of polished rice with small amounts of dried fish, pulses, oil and salt. The excessive intake of rice was to replace nutritious foods which were believed to result in large babies.

In Haiti, Jelliffe and Jelliffe (1961) pointed out that dietary restriction was not common during pregnancy. In addition, some village women did not eat fresh fruits, fish, eggplant, white beans or pork two to three months after delivery.

Kelly (1956) found identical ante-partum food habits among Mexican women. The mothers generally excluded all cold foods such as fruits and vegetables for one month after delivery and subsisted mainly on hot foods such as chocolate, coffee, tea, cinnamon and meat of a laying hen. Cold foods were believed to cause diarrhea.

Two study cases illustrate the impact of social mobility on dietary pattern. Hussain and Wadsworth (1967) reported a decline in the avoidance of certain foods by a group of Pakistani mothers who moved to Bradford, England. They surmized that the benefits of obstetrical service, the exposure to modern food patterns, the desire to belong to a new cultural group and adopt its food practices were reasonable

bases for the change in feeding habits. Gan (1967) drew attention to the breastfeeding performance of a group of West Indian mothers in a number of out-patient clinics in London, England. He stated that it was common practice to terminate breastfeeding once maternity benefits ceased, in spite of excellent lactation potential. Whereas economics was the criteria for the altered pattern among the West Indian mothers, status was the more significant factor among the Pakistani mothers.

Gopalan (1958), in a study of fourteen malnourished lactating Indian mothers, stated that for those subsisting on 60 gram protein with an output of 50 to 60 grams of protein from breastmilk daily, protein supplementation was without any beneficial effect in enhancing milk secretion. He contended that the demands of lactation were so great that when dietary protein was not available maternal tissue was sacrificed to meet the protein requirement. Therefore, protein supplementation was not manifested in increased milk flow but rather in a correction or replacement of tissue protein deficit. Thus, adequate improvement of the diet during pregnancy was essential to avoid maternal protein depletion and thereby ensure successful lactation.

Breastfeeding and Weaning Habits - Several studies confirm breastfeeding as the mainstay in infant diet for most rural mothers in developing countries. From interviews of 707 Haitian mothers with 0-4 year old children, Jelliffe and Jelliffe (1961) found successful lactation (99%) during the first six months of life, with a gradual decline to 81% in the second six months. Over 50% were still breastfeeding at 12-18 months while 9% continued to do so from 18-24 months. No subject was breastfed after two years.

Rao et al (1959) reported a similar trend among poor communities in Southern India, where 92% of the infants were breastfed for six months and over 50% up to 18 months. One child out of 5 still received mother's milk beyond two years; only two percent were not completely weaned at three years. According to Guthrie (1964) rural-urban figures for breastfeeding among 245 Filipino mothers were 86% and 41% respectively, with an average duration of 13-18 months.

Gyorgy (1970) reported that recent trends in infant feeding indicate a rapid decline in breastfeeding practice, this pattern being consistent in the rural-urban populace throughout the world. In Guatemala, 98% of rural Indian children continue to nurse after their first burthday. In Indonesia the comparable figures are 90% and 70%. In Taiwan 97% of the rural mothers were found to breastfeed for 6 months as compared with 61% of their urban counterparts. In Gambian cities lactation ends between 6 and 9 months after delivery, while in rural areas weaning occurs between 12 and 24 months. In one rural Mexican village in the years 1960-1966 the percentage of infants under six months of age who were solely breastfed declined from 95 to 73. For the state of Arkansas, U.S.A., in the year 1946, 84% of the infants were breastfed (totally or partially) compared with 22% in 1966. Analogous figures for California were 60% and 38% respectively.

Data from a Brazilian study (Gyorgy, 1970) on 879 public maternity centers show that 44% of infants were fully breastfed for one day post-partum. In 1949 95% of Chilean mothers breastfed up to 12 months while only 6% did so in 1969. Similar declining trends in breastfeeding among

urban elite were observed in the West Indies, Trinidad, and Jamaica.

The shift from the use of mother's milk to artificial formula together with progressively shorter periods of nursing, coupled with urbanization and social mobility have strong implications for the incidence of malnutrition among increasingly younger children.

Jelliffe (1966) contends that for most tropical and subtropical countries, prolonged breastfeeding is the prevailing practice. The average age at weaning varied from 13 months to 3 years. The majority of the mothers claimed preference for mother's milk because it was inexpensive and breastfed children were healthier than their artificially fed counterparts. Jelliffe further pointed to the contraceptive function of prolonged lactation as a strong cultural belief held among rural mothers in many parts of the world.

In an investigation undertaken in the rural parish of Crulai, Normandy in 1674-1742, Tietze (1961), showed that the mean interval between two successive live births was 30.5 months if the older child lived to one year compared to 20.5 months if the child died in infancy. Post-partum infertility was 4 months for non-lactating women, but varied among lactating mothers. Prolonged amenorrhea tended to be associated with lactation.

It has been reported that a prolactin inhibiting factor present in the hypothalamus is greatly depressed by sucking stimulus, with release of milk secretion (WHO, 1965). The concept still stands that in the absence of ovulation during amenorrhea or lactation, conception is rare.

Welbourn (1966) mentioned that in Baganda, Africa, it was the belief that milk of a pregnant mother was poisonous to the suckling child. It was on this premise that the most common reason for weaning among village mothers was the onset of another pregnancy.

Herskovits (1937) stated that complete weaning from the breast can be accomplished either gradually or abruptly. Common village methods included painting of the breast with bitter substances (pepper, lalua, garlic), sleeping apart from the child, giving herbal infusion or offering the child his favorite food. The abrupt weaning by physical separation has been considered by many workers as the most traumatic process precipitating kwashiokor in borderline cases of malnourished children. The anorxia frequently observed after weaning aggravates the already precarious nutritional state of the young toddler. The cumulative effect of emotional deprivation, inadequate mother's milk, and a highly contaminated nutritionally deficient transitional diet mark the weaning period as a crucial phase in child's growth and development.

Transition Period Diet - In recent years the term transition period has come to be associated with weaning time (Cameron and Hofvander, 1971). Jelliffe and Jelliffe (1961) reported the transitional diet of 129 infants and 377 1-4 year old San Blas Indian children of Panama. Food was introduced in the second half of the first year of life to two-thirds of the children. It consisted mainly of ripe mashed banana and yam cassava boiled into a puree. Fish, although in abundance, was not given because the bones were considered dangerous to the child. Modified adult diet was introduced in increas-

ing amounts during the second year.

Cross cultural reports note common transitional foods such as mashed steamed plantain and sweet potato from Baganda, maize and mashed banana in Haiti, cereal products such as strained rice in Burma and Southern India, mashed banana and rice gruel in the Philippines, and maize gruel in Latin America. It was evident from the above that the semi-solids introduced lacked protective foods (Welbourn, 1966; Jelliffe and Jelliffe, 1961; Sharma, 1955; Jelliffe, 1966; Guthrie, 1964; Nurge, 1957; Sanjur et al, 1970).

Sanjur et al (1970) cited studies of feeding attitudes in rural areas where the families, through empirical reasoning, have established their own concept of causal relationship between food and disease, with the result that foods of high protein value were considered harmful to the child. Meat was considered indigestible for the young child's stomach. Colostrum was also discarded as a waste product. It is a traditional African practice that meat and the best portion of the family meal be reserved for the male member of the household (Welbourn, 1966).

Wellin (1958) mentioned the belief in the inter-relatedness of child feeding practices to defined body image as the dirty stomach concept. It was a common practice to institute therapeutic starvation and purgatives in cases of diarrhea to clean the stomach and rest the intestine.

It has been well recognized that improved availability of food becomes significant only to the extent that it leads to proper utilization in the child's dietary pattern. Unfortunately, cultural blocks

which influence food consumption are often the decisive ones. Nutrition education in the more traditional communities is so difficult because one has to displace deep seated beliefs and supply knowledge where there is none.

Malnutrition and Infection - Infant and toddler mortality are important indices of the stresses that disease and malnutrition play in the distortion of normal growth and development of a child in the crucial formative years (Gordon and Scrimshaw, 1970). The synergistic action of infection and malnutrition are classically exemplified by kwashiokor.

Kwashiokor is a nutritional syndrome primarily due to protein deficiency. It develops after 6 months of age and commonly between 1 and 4 years. It is prevalent in areas where starchy foods are the staple diet. Tubers such as bananas, sago, and excessive sweetened condensed milk with rice predispose children to the development of kwashiokor. The kwashiokor child is often irritable, lethargic and anorexic. Tivial edema, easy pluckability of hair and depigmentation at previous ulcer sites are pathognomonic signs.

Marasmus is the most common form of malnutrition in infancy. It is primarily a caloric deficiency disorder due to insufficient and over diluted milk formula as diet and symptomatized by recurrent bouts of diarrhea and respiratory infections. The victim is emaciated, active with voracious appetite and wizened old man facie.

Stevenson (1947) studied 263 infants from Boston, Massachusetts. He observed that respiratory infection in the second half of the first year of life was more prevalent among artificially fed infants. He

contends that the high vitamin A and ascorbic acid content of mother's milk could have contributed to the stronger resistance of breastfed subjects. The report by Norval and Kennedy (1949) on 417 cases from Rochester, Minnesota indicated the opposite. In their series, the breastfed children had a higher incidence of respiratory illness in the same period of life. The discrepancies between the two studies have been attributed to other variables influencing the result more than the method of feeding.

Although not conclusive, findings by Bullen and Willis (1971) have demonstrated that E. coli is inhibited by the iron-binding protein of milk. The study survey conducted by South-East England Faculty of the Royal College of General Practitioners (1972) during the period 1968-1970 covered 334 children. Results showed that there was very little difference in the incidence of infection between breastfed and non-breastfed children.

Studies by Philips and Wharton (1968) confirmed the serious result of bacterial infection in 75 malnourished children, composed of 63 kwashiorkors and 12 marasmic cases. The overall mortality was 13% (9 cases) and management was particularly difficult due to the Salmonella (garoli) strain which was highly resistant to chloramphenicol, tetracycline and ampicillin. It was emphasized that antibiotics be prescribed only in the presence of particular infection such as skin, chest or intestines and not to be given routinely.

In a post mortem study of 118 African children Schonland (1972) showed bulk reduction of the thymus gland and peripheral lymphoid tissue more marked in kwashiorkors than in marasmus. It was proposed

that the stress situation in the infection caused the depression of cell mediated immunity. The immunologic incompetence was a consequence of nutritional deprivation (PCM).

In an effort to combat malnutrition, Cook (1971) was of the opinion that hospital management of severe cases of malnutrition in young children offered little advantage in cost and effectiveness of service. Public health workers are convinced that detection and surveillance of mild PCM cases would afford better means of prevention and control if we are ever to solve the problem of malnutrition.

The preceding literature review has offered evidence to support the contention that an ecological perspective on the study of malnutrition is of considerable value. Not only diet of the child, but the demographic and socio-cultural disposition of the mother is seen as an important factor in determining the eventual nutritional status of offspring.

## METHODOLOGY

### Sampling Procedure

Village Selection - The communities of St. Michael and Lalomas were selected on the basis of the following criteria:

1. Study areas were adjacent to one another.
2. The two communities demonstrated differences in life styles.
3. A nutrition education program existed in one community (St. Michael), while no such program was available in the other community (Lalomas).
4. In each community there was a prevalence of cases of protein-calorie malnutrition and other nutritional disorders as documented by health records.
5. Respondents willingly participated in the survey.

Village Description - St. Michael and Lalomas are two of the eight districts that compose the community of St. Michael de L'Atalaye. Both are located along the northwestern mountainous terrain of Haiti, about 216 kilometers from the capital, Port-au-Prince. These north and border sectors of the country are of low agricultural productivity as compared to the more fruitful southern peninsula.

A majority of the Haitians are farmers by occupation, deriving bare existence from the products of their small plots. Coffee is the main cash crop of the more fortunate farmers. Common farm products are beans, rice and plantain. Meat, poultry and fish serve as cash crops and hence play a very limited part in the child's diet. Haitian mothers are mostly housekeepers. Their important role in trade is as

market women. The market day system serves as a social outlet for the women, who otherwise are always confined to the family and home chores.

Roads and transportation facilities are poor. Farm products are carried to market by donkeys and on the head of the village women.

The size and site of the village varies depending upon the availability of flat land and water supply. Cailles (village cottages) are built of mud and sticks. They consist of one or two rooms with one table and a couple of chairs. The hut usually includes a kitchen located adjacent to or extending from the main house to prevent the smoke from wood or charcoal from entering the cottage. Fruit trees and vegetables abound. Domestic animals (chickens, pigs, goats and dogs) are kept close to the cottage.

The social village structure is headed by the "Chef de Section." Religion is closely associated with village life. Catholics are a minority compared to the Baptists. Vodum and witch doctors still prevail in isolated sections of the village.

St. Michael de Atalaye is the most progressive of the eight districts. St. Michael serves as the focal point for the entire community. It has an estimated population (1973) of 5,000 and one thousand (1,000) houses. The HACHO (Haitian American Community Help Organization) office supervises the activities of the medical clinic and Mothercraft Center. Other coordinating agencies involved in community development make St. Michael a very busy "bourge" (town). Two primary schools (Baptist and Catholic) function under the guidance of Pastor Abraham Lubin (Baptist Minister) and Fr. Peter (Catholic priest). The local government offices (mayor's office, municipal jail, tax collector) for

for the eight districts are located in the community of St. Michael de L'Alalaye.

Residential houses radiate from the plaza (town square) or are crowded adjacent to the market place and public buildings. Houses are constructed of the typical cailles material or concrete. Crowded houses, improper toilet and sewage disposal, and muddy roads all add to the poor sanitary conditions. The water supply comes from the river via an electrically operated deep well. Children and adults tread long lines to fetch water in their earthen jars or tin cans. Only the concrete buildings are provided with faucets. Water from electrically operated pumps is distributed at 6:00 a.m. and 10:00 p.m. No telephone or mail services are available. The nearest postal service was Gonaive which is a one hour drive from St. Michael. Transportation facilities are provided by private jeeps, HACHO vehicles, horseback or donkey.

The Mothercraft Center is an important feature of St. Michael. In the concept of the Haitian Bureau of Nutrition, it is a practical approach to the solution of the country's problem of malnutrition. King (1967) indicated that a center's primary goal is nutrition education of the peasant mothers in techniques compatible with their level of understanding and limited financial resources. The typical community Mothercraft Center operates 5 days a week, for a duration of 4 months. Three to four mothers stay at the center daily and an average of 30 children are given two meals a day as prepared by the mothers under the supervision of the "Responsible." Instruction in child care and sanitation are also included in the overall health education. The participating children are chosen from a village weight survey and are weighed

weekly while in the center. A child is admitted to the nutrition center only if the mother agrees to actively participate in the program.

Criteria for the establishment of the Mothercraft Center include:

1. Established need as indicated by prevalence of cases of malnutrition.
2. Geographically located to be easily accessible to the targeted population and sector.
3. Active support of the community.

The commercial section of St. Michael consists of the market place, local grocery stores, small retail stores, bakery and tailoring shops. The market days are Tuesday and Friday. Food commodities consist of rice, corn, plantain (green bananas) and cassava. There are seasonal fruits such as avocado, mango, melon, and citrus. Green leafy vegetables and eggplant, tomatoes and beans of all varieties are in abundance. Meat is sold fresh or salted.

Lalomas is two kilometers north of St. Michael. It is largely agricultural with rice, corn, coconut and beans as the main farm crops. The population of the section surveyed is 800 with 150 houses. The houses are constructed of common cailles material and dispersed further apart atop a hill or along mountain slopes. Again, the kitchen is an extension of the main house or separated from the hut. Kitchen utensils include earthen pots or aluminum pans. Most of the homes raise domestic animals such as dogs, goats and chickens. Without exception, a well-kept garden plot adjacent to the house fenced by well-trimmed cactus is typical.

Fourteen homes of the 108 interviewed had toilets (pit system or

or open hole). The water supply came mainly from two rivers and one pump well located in the central section of the village with the Baptist compound. Whereas, in St. Michael, administration comes from the HACHO administrator, Dr. Moulriere Pamphile, in Lalomas the district is headed by a very active president of the "Le Comite directeur ou councail communautaire de Lamine Lalomas."

#### Respondents.

The survey was undertaken during the month of July, 1973, spanned three weeks (July 7-28), and covered 240 pre-school (0-4 years of age) children each accompanied by an adult. Twelve individuals were excluded from the sample because the interviewee was not the mother of the child. A total of 228 subjects, 120 from St. Michael and 108 from Lalomas were obtained. A purposive sampling method was used in the selection of the participants. In line with the argument of Sanjor et al. (1970):

The basic assumption behind purposive sampling was that with good judgment and appropriate strategy, one could develop a sample that was satisfactory in relation to one's need and relevancy on the dimension to be studied. If feeding practices and weaning habits were to be studied during the first months of life, if attitudes and beliefs of those women towards diet during pregnancy and lactation were to be explored, it follows that these features could only be studied by including in the sample women with children less than twelve months of age.

#### The Instrument.

The interview questionnaire was divided into three parts designed to collect information on:

1. Section 1 - demographic data on family composition, maternal characteristics (age, occupation and literacy level), child feeding practices, types of infant feeding (mild), age at cessation of breast-feeding and age of introduction of first semi-solids.

2. Section 2 - assessment of nutritional status by the use of anthropometric measurements.

3. Section 3 - types of food given as transitional diet (first semi-solids).

A copy of the instrument is presented in Appendix I.

#### Anthropometry.

Nutritional anthropometry is concerned with the measurements of the variations of the physical dimensions and gross composition of the human body at different age levels. The following paragraphs describe the criteria employed in obtaining the various anthropometric measurements used in this study.

Weight - Detecto Scales were used (calibrated in kilograms).

For children above three years old, the adult scale was used. For children ages 0-36 months, the infant scale was preferred. Both scales were placed on a firm surface and the lever accurately adjusted to zero weight before measurements were taken. The subjects were weighed undressed except for underwear. The young child (0-24 months) was placed on the infant scale, whereas the older child stood at the center of the platform of the adult scale. Weights were recorded in kilograms to the nearest tenth. Gomez's classification of the degree of malnutrition according to percent standard weight was used (Gomez et al., 1956).

Height - For height measurement, a steel rod attached to the Detecto scale was adjusted to the desired level as the subject stood at the center of the platform barefoot with feet firm, straight and parallel to each other. For small children, crown of head to heel length was measured with a measuring tape, fixed to a flat portable wooden

table (infantometer). All heights were recorded to the nearest 0.5 cm.

The Survey Team.

The survey team was composed of the student, a Haitian interpreter and two volunteers (an American student nurse and a Haitian high school student).

Site of Field Examination and Line of Flow - In St. Michael two sites were selected and included the Medical Clinic building and a vacant room of the Catholic school. The former station included sample children from the mid-section to the southern end of the locality (district), while the latter section included participants from the central portion to the northern end of St. Michael. The presence and purpose of the survey group was explained during the Sunday Services by both the Baptist minister and the Catholic priest. The health personnel volunteered to inform mothers with 0-3 year old pre-schoolers to bring their children for examination.

In Lalomas arrangements for the survey schedule were undertaken by the minister, HACHO representative and a very active local council. The Baptist compound, which was centrally located in the district, was utilized as the third site for field examination. In all three stations the standard procedure consisted of: (1) the receiving section where the mothers were given numbers on their corresponding interview sheet; (2) height and weight of sample children were taken and recorded by the volunteer nurse; (3) clinical examination of children and measurement of head, chest and mid-arm circumference and skinfold thickness by the investigator; (4) interview of mothers by the Haitian interpreter.

Definition of Major Terms. The following definitions of terms are employed throughout this study:

1. Nutrition - the science of food and the nutrient as seen in relation to health.
2. Public Health Nutrition - consists of the proper organization of food supplies needed for the individuals and communities; nutrition survey, nutrition education, supplementary feeding and administration and planning are included in the area of public health nutrition.
3. Undernutrition - the pathological state resulting from the consumption of an inadequate quantity of food over an extended period of time.
4. Malnutrition - the quality rather than the quantity of food that is inadequate resulting in a relative or absolute deficiency of certain essential nutrients.
5. Responsible - a young girl trained by the Haitian Bureau of Nutrition and charged with the responsibility of nutrition instruction and supervision of participant mothers and children in the Mothercraft Center.
6. Nutritional levels - refers to Stuart standard as given by Jelliffe in the WHO monograph series no. 59. Assessment of the nutritional status of the community.
7. Mothercraft Center - refers to a nutritional rehabilitation center in Haiti in which the mother receives nutritional education and the child serves as visual evidence of the ability to rehabilitate malnourished children. (King, 1967).

Degrees of malnutrition or nutritional status were categorized according to the Gomez classification and are as follows:

Third degree (severe)	-	below 60% weight for age
Second degree (moderate)	-	60-74.9% weight for age
First degree (mild)	-	75-90% weight for age
Normal	-	over 90% weight for age

Nutritional and health status are terms used synonymously in this study. Nutritionally vulnerable groups include pre-school children (0-6 years of age) and lactating mothers.

#### Scope and Limitations of the Study.

The greatest hindrance to the in-depth investigation of the socio-cultural variables employed in this investigation was the language barrier. There was considerable difficulty in the translation of English terms to local parlance (Creole). The inability of the Haitian interpreter to pursue answers that required elucidation, such as "certain reasons for weaning", confounded the problem further. Mothers responded briefly and simply. An open-ended type of questionnaire would be useful provided that sufficient time and greater inquiry were possible. However, detailed questioning further confuses the respondent, increasing the risk of eliciting answers thought to please the interviewer.

## RESULTS AND DISCUSSION

As mentioned previously, the total sample was composed of 228 pre-school children and their mothers. For purposes here, the nutritional status of the children has been dichotomized. Those moderately or severely malnourished were grouped together, while normal children or those displaying mild symptoms of malnutrition comprised the second group. Of the 228 children, 78 or 34.2% of the sample were moderately or severely malnourished and 150, or 65.8% normal to mildly malnourished. In this section we will endeavor to distinguish the two groups on the basis of various characteristics such as age and literacy level of the mother, age, sex and diet of the child and weaning practices.

### Maternal and Family Characteristics

Table 1 presents the nutritional status of the child in relation to mothers' age. A statistically significant difference between the groups was not found; however, there appears to be a slight decrease in the proportion of severely or moderately malnourished children of women 36 years of age or older in comparison to children of younger women. This pattern may be attributed to the possibility that younger women may have a greater number of children in nutritionally vulnerable age group than women in the later stages of the child bearing years. No data to support this contention was obtained from sample subjects, however.

As demonstrated in Table 2, literacy level of the mother was not a statistically significant factor in distinguishing the two groups of

TABLE 1. AGE OF MOTHER IN RELATION TO THE  
NUTRITIONAL STATUS OF THE CHILD

Mother's Age	Nutrition Status of Child					
	Moderate/Severe		Normal/Mild		Total	
	N	%	N	%	N	%
15-25	15	31.3	33	68.7	48	100.0
26-35	33	37.5	55	62.5	88	100.0
36-45	12	29.3	29	70.7	41	100.0
46 +	2	25.0	6	75.0	8	100.0
Unknown	16	37.2	27	62.8	43	100.0
Total	78	34.2	150	65.8	228	100.0

$\chi^2 = 1.57$  with 3 df (not significant)

TABLE 2. LITERACY LEVEL OF MOTHER IN RELATION  
TO NUTRITIONAL STATUS OF CHILD

Literacy Level of Mother	Nutrition Status of Child					
	Moderate/Severe		Normal/Mild		Total	
	N	%	N	%	N	%
Literate	25	34.7	47	65.3	72	100.0
Illiterate	53	34.0	103	66.0	156	100.0
Total	78	34.2	150	65.8	228	100.0

$\chi^2 = 0.014$  with 1 df (not significant)

women. For example, 34.7% of the children of literate mothers and 34.0% of those of illiterate women were moderately or severely malnourished. The six children of illiterate women aged 15 to 25 were generally under two years of age, and with the exception of one child who was mixed fed, all were completely breastfed. In contrast, nine of the children of women of the same age who were literate ranged in age from 6 months to 3 years, and with the exception of one who was bottlefed, the remaining eight were mixed fed. It appears, at least on the surface, that literate and illiterate mothers differ according to feeding practices, age of children, and to a slight extent, the nutritional status of these children. It may be that literacy and the greater child rearing experience (or fewer children in the nutritionally vulnerable age group) which comes with age result in a slight decrease in the rate of malnutrition of children. This trend is less evident for older illiterate mothers. (See Appendix II for a breakdown of nutritional status of children according to mother's age and literacy level.)

Table 3 presents the nutritional status of the sample children in relation to family size, here interpreted as number of siblings. Because of the relatively small sample size, number of siblings has been dichotomized into the groups one or two siblings and three or more. This variable was not a significant factor in distinguishing between moderately or severely malnourished children, and those who were normal or mildly malnourished. While the age distribution of siblings was not obtained, it may be a factor to be considered in the future. For example, a high concentration of children in the nutritionally vulnerable age group in one family should be expected to rapidly deplete the nutri-

TABLE 3. DISTRIBUTION OF CHILDREN ACCORDING TO  
NUMBER OF SIBLINGS AND NUTRITIONAL STATUS

Number of Siblings	Nutrition Status of Child					
	Moderate/Severe		Normal/Mild		Total	
	N	%	N	%	N	%
1-2	32	33.7	63	66.3	95	100.0
3 or more	46	34.6	87	65.4	133	100.0
Total	78	34.2	150	65.8	228	100.0

$\chi^2 = .020$  with 1 df (not significant)

tional value of an already insufficient diet.

#### Characteristics of the Child

The distribution of children severely or moderately malnourished was not found to be random when age of the child was considered (see Table 4). More specifically, children 0-12 months of age were significantly different from the older children in the sample ( $\chi^2 = 23.2$  with 3 df,  $\alpha = .05$ ), in that they tended to have fewer numbers in the severely or moderately malnourished category. This finding may, in part, be attributed to the likelihood that younger children have only recently been weaned, if at all, and are therefore less vulnerable to nutritional deficiencies.

While age was a significant factor in discriminating between the two groups of children, sex was not found to be important (Table 5). The sample was approximately equally composed of males and females (111 males, or 48.7% vs. 117 females, or 51.3%). Only a slightly smaller proportion of males than females (33.5% males vs. 35.0% females) was classified as moderately or severely malnourished.

Table 6 presents the nutritional status of children in relation to the type of milk feeding received. A Chi-square analysis revealed no significant differences among the groups. While bottlefed children appear to be less severely malnourished, the number in this category is so small (N=7) that further interpretation would be superficial at best.

Age at the first introduction of semi-solid foods was not found to appreciably distinguish between the groups (see Table 7). Those children not yet receiving semi-solid foods, however, displayed a slighter inci-

TABLE 4. DISTRIBUTION OF CHILDREN ACCORDING TO AGE  
IN MONTHS AND NUTRITIONAL STATUS

Age of Child	Nutrition Status of Child					
	Moderate/Severe		Normal/Mild		Total	
	N	%	N	%	N	%
0-12	15	16.3	77	83.7	92	100.0
13-24	27	42.2	37	57.8	64	100.0
25-36	26	52.0	24	48.0	50	100.0
37 +	10	45.4	12	54.6	22	100.0
Total	78	34.2	150	65.8	228	100.0

$\chi^2 = 23.2$  with 3 df significant  $\alpha = .05$

TABLE 5. DISTRIBUTION OF CHILDREN ACCORDING  
TO SEX AND NUTRITIONAL STATUS

Sex	Nutrition Status of Child					
	Moderate/Severe		Normal/Mild		Total	
	N	%	N	%	N	%
Male	37	33.3	74	66.7	111	100.0
Female	41	35.0	76	65.0	117	100.0
Total	78	34.2	150	65.8	228	100.0

$\chi^2 = 0.06$  with 1 df (not significant)

TABLE 6. DISTRIBUTION OF CHILDREN ACCORDING  
TO TYPE OF INFANT FEEDING (MILK)  
AND NUTRITIONAL STATUS

Type of Feeding	Nutrition Status of Child					
	Moderate/Severe		Normal/Mild		Total	
	N	%	N	%	N	%
Breastfed	46	34.1	87	65.9	133	100.0
Mixed Fed	31	36.0	57	64.0	88	100.0
Bottlefed	1	14.3	6	85.7	7	100.0
Total	78	34.2	150	65.8	228	100.0

$\chi^2 = 1.36$  with 2 df (not significant)

TABLE 7. DISTRIBUTION OF CHILDREN ACCORDING TO  
AGE AT FIRST INTRODUCTION OF SEMI-SOLID FOOD  
AND NUTRITIONAL STATUS

Age at intro- duction of first semi- solid (months)	Nutritional Status of Child					
	Moderate/Severe		Normal/Mild		Total	
	N	%	N	%	N	%
0-6	66	34.6	125	65.4	191	100.0
7 +	9	36.0	16	64.0	25	100.0
No semi-solids	3	25.0	9	75.0	12	100.0
Total	78	34.2	150	65.8	228	100.0

$\chi^2 = 0.49$  with 2 df (not significant)

dence of severe or moderate malnutrition. Again, as was the case with bottlefed children, the number in this category is too small to allow further speculation.

Whether or not a child had been weaned was a statistically significant factor in assessing nutritional status (see Table 8). Children not yet weaned were predominantly classified as normal or mildly malnourished (75.4%) while those who had been weaned were more likely to be moderately or severely malnourished (46.0%). A Chi-square value of 11.4 (df=1) was significant at the  $\alpha=.05$  level. This factor lends credence to the previous finding that younger children were more adequately nourished than older children.

The distribution of the samples according to community of residence is presented in Appendix III. As displayed in Appendix IV, the mean duration of milk feeding ranged from 15.9 to 21.6 months. The mean age for the introduction of semi-solids ranged from 17.3 to 18.8 months. Some children received semi-solids as early as two months of age.

#### Additional Observations

A comparative assessment of the infant feeding practice in the two communities, St. Michael (urban) and Lalomas (rural) clearly illustrates the influence of life style or social mobility on the child's dietary pattern. Whereas, in St. Michael 27 sample children were breastfed, the number in Lalomas was 106. On the other hand, 86 participant children were mixed fed in St. Michael and only 2 in Lalomas. As a whole, 221 (97%) of the children received mother's milk.

As indicated in table 2, there was no significant difference in the

TABLE 8. DISTRIBUTION OF CHILDREN ACCORDING  
TO WEANING PRACTICE AND  
NUTRITIONAL STATUS

Weaning Practice	Nutritional Status of Child					
	Moderate/Severe		Normal/Mild		Total	
	N	%	N	%	N	%
Not Weaned	31	24.6	95	75.4	126	100.0
Weaned	47	46.0	55	54.0	102	100.0
Total	78	34.2	150	65.8	228	100.0

$\chi^2 = 11.4$  with 1 df (not significant  $\alpha = .05$ )

nutritional status of children, of literate or illiterate mothers. In this study the index for literacy was the indicated ability to read and write.

Of 228 respondent mothers, 189 (83%) were housekeepers and 39 (17%) were shop keepers. Of the housekeepers, 68.3% solely breastfed and 31.7% mixed fed, while among mothers with other occupations, 74.4% mixed fed and only 12.8% breastfed. Thus, the greater the demands on the mother, the greater her tendency to supplement her milk.

It was reported by 48% of the respondent mothers that children were often ill between birth and weaning time.

The detrimental effects of poor quality contaminated transitional diet is strongly suggested. In order of frequency, the food items introduced as transitional diet were boiled cassava, plantain, vegetable soup (legume), egg and rice or corn gruel. Sources of advice on child feeding included the mother herself, Mothercraft responsible, health personnel, and peers.

There was no change in the diet for women during pregnancy and lactation; seventy-one percent of the mothers reported that they did not modify their dietary patterns during these periods.

In this study, weaning has the actual cessation of mother's milk. The two most common reasons for weaning given were as follows: (1) it was time to wean; (2) the onset of another pregnancy. The former referred to the ability of the child to walk and to chew solid foods. The weaning process was gradual and generally consisted of painting the breast with a bitter substance called Lalua. The reasons and methods point to a traditionally inclined practice.

As indicated in table 8, sample children who were not weaned were nutritionally better than those already weaned. Of the unweaned child participants eighty-one were infants, thirty were two years old, and twelve over two years. Age still counts as an important variable.

The prevailing infections were colds, diarrhea, and dermatitis (scabies). Bilateral neck adenitis was observed in 70 cases; parasitism, conjunctival pallor and enlarged abdomen were frequently observed. Eight cases of PCM 94 kwashiorkor and 4 marasmus) and evidence of iron and vitamin A deficiency are documented in Appendix V.

## SUMMARY AND CONCLUSIONS

A cross-sectional survey was undertaken in the communities of San Michael and Lalomas, Haiti in July 1973. The sample included 228 pre-school children and their mothers. Assessment of the nutritional status of the participant children in relation to the feeding practices and weaning habits of their mothers was conducted.

Among the demographic variables considered, only the age of the child was a relevant determinant of the health status of the children. This was recognized by the Haitian Bureau of Nutrition and motivated the establishment of a nutrition center (Mothercraft) in St. Michael. Reports of a high incidence of protein-calorie malnutrition in the community was not practical at the time of the survey.

Of the total sample, 78 children (34.2%) were found to be moderately or severely malnourished. There was a significant relationship between the age of the children and their nutritional status. Children 0-12 months of age evidenced consistently fewer cases of moderate or severe malnutrition than those over 13 months of age. The pattern appeared to be consistent in both communities. There was no apparent association between the type of infant (milk) feeding and the level of nutritional status. However, children who had been weaned displayed a greater incidence of moderate or severe malnutrition, and this finding was statistically significant. The early introduction of poor quality, contaminated transitional foods seems to contribute to frequent illness before weaning time and therefore, appears to be nutritionally detrimental. Poor sanitary conditions - primarily the lack of toilet facilities -

foster a high prevalence of parasitism, anemia and vitamin A deficiency. In the presence of general good dental condition, the frequent bouts of cold and bilateral neck adenitis are highly suggestive of a tuberculous infection prevalent in tropical and subtropical regions.

Little variation in diet for pregnant and lactating women was reported. The transitional diet for children in the weaning process consisted primarily of foods available in the community, such as cassava, plantain and legumes.

The importance attributed here to the age of the child and the stage at which he is weaned seems to suggest the propitious nature of adopting an ecological perspective for the study of malnutrition. Future research in this area should concentrate more closely on family composition; more specifically, what is the influence of the presence of two or three children in the nutritionally vulnerable age group on the nutritional status of a target child. While younger women in this sample had a larger proportion of children in the moderately or severely malnourished category, it was not determined specifically whether or not this phenomenon was due to mother's age or the prevalence of more children in the nutritionally demanding age category. The malnourished child must not be examined in isolation - to the extent that he is a member of an ecological system such as the family, the cause and incidence of malnutrition must be examined from the standpoint of the family as a unit.

## LITERATURE CITED

- Bengoa, J. M. Nutrition Rehabilitation Centers, *Journal of Tropical Pediatrics*. 13: 169, 1967.
- Bullen, C. L. and A. T. Willis. The resistance of Breastfed infants to gastroenteritis. *British Medical Journal*. 3: 338 (8/7) 1971.
- Cameron, M. and Y. Hofvander. Manual on Feeding Infants and Young Children. Protein Advisory Group of the United Nations System PAG Document 1. 14/26: 23, 1971.
- Cook, R. Is the hospital the place for the treatment of malnourished children. *Journal of Tropical Pediatrics and Environmental Child Health*. 17: 15, 1971.
- Edozien, J. C. Malnutrition in Africa - Need and basis for action. Malnutrition is a Problem of Ecology *Bibl. Nutr. Diet*. 14: 64, 1970.
- Fougere, W. Nutrition studies in Haiti. IN: *Proceedings Western Hemisphere Nutrition Congress II*. Copyright by American Medical Association, Chicago, Illinois: 1968, p. 155.
- Gan, B. Nutrition status of West Indian Immigrants. *Proc. Nutr. Soc.* 26: 218, 1967.
- Gomez, F., R. R. Galvan, S. Frenk, J. C. Munoz, R. Chavez, and J. Vasquez. Mortality in second and third degree malnutrition. *Journal of Tropical Pediatrics*, 2: 77-83, 1956.
- Gopalan, O. Studies on Lactation in poor Indian communities. *Journal of Tropical Pediatrics*. 4: 12, 1958.
- Gordon, J. E. and N. S. Scrimshaw. Infectious disease in the malnourished. *Medical Clinic of North America*. 54: 1495, 1970.
- Grant, F. W. and D. Groom. A dietary study in Haiti. *Journal of American Diet. Association*. 34: 708, 1952.
- Guthrie, H. A. Infant feeding practices in five community groups in the Philippines. *Journal of Tropical Pediatrics*. 10: 64, 1964.
- Gyorgy, P. and O. L. Kline, eds. Malnutrition is a problem of ecology. *Bibl. Nutr. Diet*. 14: 1, 1970.

- Hanlon, J. J. An ecological view of public health. *American Journal of Public Health.* 59: 4, 1969.
- Havelock, R. G. Planning for Innovation through Dissemination and Utilization for knowledge. Center for Research on Utilization of Scientific Knowledge. Ann Arbor: Institute for Social Research, The University of Michigan, 1971.
- Herskovits, Melville. Life in a Haitian Valley. Garden City, New York: Doubleday, 1937.
- Hussain, M. A. and G. R. Wadsworth. Nutritional status of Asian Infants. *Proc. Nutr. Soc.* 26: 212, 1967.
- Jelliffe, D. B. Culture, social change and infant feeding - Current Trends in Tropical Regions. *American Journal of Clinical Nutrition.* 10: 19, 1962.
- Jelliffe, D. B. Infant nutrition in the tropics and subtropics. World Health Organization. Monograph Series no. 53. Geneva, 1966.
- Jelliffe, D. B. The assessment of the Nutritional Status of the Community. World Health Organization. Monograph Series no. 53, Geneva, 1966.
- Jelliffe, D. B. and Jelliffe, E. P. Nutritional status of Haitian children. *Acta Tropica (Basel) Suppl.* 18: 1, 1961.
- Jessor, R. and E. Richardson. Psychological deprivation and personality development. 1968. In: Perspective on human deprivation: Biological, Psychological, and Sociological. National Institute of Child Health and Human Development, National Institutes of Health Public Health Service, U. S. Department of Health, Education and Welfare.
- Katz, D. and R. L. Kahn. *The Social Psychology of Organizations.* New York: John Wiley and Sons, Inc. 1966.
- Kelly I. An anthropological approach to midwifery training in Mexico. *Journal of Tropical Pediatrics.* 1: 200, 1956.
- King, K. W. Community Mothercraft centers. Research Division, Virginia Polytechnic Institute, Biochemistry and Nutrition. 13: 1967.
- King, K. W., G. Dominique, G. Uriodain, W. Fougere, and L. D. Beghin. Food patterns from dietary survey in rural Haiti. *Journal of American Diet. Association.* 53: 114, 1968.
- Miller, J. G. The nature of living systems. *Behavioral Sci.* 16: 277-301, 1971.

- Norval, M. A. and R. L. J. Kennedy. Illnesses within the first year of life. *Journal of Pediatrics*. 35: 43, 1949.
- Nurge, E. Infant feeding in the village of Guihangdan, Leyte Philippines. *Journal of Tropical Pediatrics*. 3: 89, 1957.
- Philips, I. and B. Wharton. Acute bacterial infection in kwashiorkor and marasmus. *British Medical Journal*. 1: 407, 1968.
- Population Program Assistance, U. S. AID Bureau for Population and Humanitarian Assistance. Washington, D.C., 1972.
- Rafalski, H. and M. Mackiewicz. An epidemiologic study of physical growth of children in rural districts of Poland. In: *Malnutrition, Learning and Behaviour*. Scrimshaw, N. S. and Gordon, J. E., Cambridge. M. I. T. Press, 1968.
- Rao, S., M. C. Swaminathan, S. Swarp, and V. N. Pathwardan. Protein malnutrition in South India. *World Health Organization Bull.* 20: 603, 1959.
- Sanjur, D. M., J. Cravioto, L. Rosales, and A. Van Veen. Infant feeding and weaning practices in a rural preindustrial setting. A socio-cultural approach. *Acta Paediat Scand. Suppl.* 200. 1970.
- Schonland, M. Deparession of immunity in OCM. A post-mortem study. *Journal of Tropical Pediatrics and Environmental Child Health*. 17: 217, 1972.
- Scrimshaw, N. S. Ecological factor in nutritional disease. *American Journal of Clinical Nutrition*. 14: 112, 1964.
- Sebrell, E. H. Jr., S. C. Smith, E. I. Severinghaus, H. Delva, B. L. Reid, H. S. Olcott, J. Bernadette, W. Fougere, G. P. Baron, G. Nicolas, K. W. King, C. C. Brinkman, and E. E. French. Appraisal of nutrition in Haiti. *American Journal of Clinical Nutrition*. 7: 658, 1959.
- Sharma, D. C. Mother, child and nutrition. *Journal of Tropical Pediatrics*. 1: 47, 1955.
- Sims, L. S. Nutrition status of preschool children in relation to selected factors characterizing the family environment. An ecological approach. Ph. D. Dissertation, Michigan State University 1970.
- Sims, L. S., B. Paolucci, and P. M. Morris. A theoretical model for the study of nutritional status. An ecosystem approach. *Ecology of Food and Nutrition*. 1: 197, 1972.

- Stevenson, S. S. The adequacy of artificial feeding in infancy. *Journal of Pediatrics*. 31: 616, 1947.
- Tietze, C. Effect of Breastfeeding on the Rate of Conception. Reprinted from the proceedings of the International Population Conference, New York. Vol. II p. 129, 1961.
- Welbourn, H. F. African child Health. *Journal of Tropical Pediatrics and Environmental Child Health*. 2: 12, 1966.
- Wellin, E. Maternal and Infant Feeding practices in a Peruvian village. *Journal of American Dietetic Association*. 31: 157, 1958.
- \_\_\_\_\_. Food and Nutrition Board. Committee on Nutrition Anthropometry National Research Council. Recommendations concerning body measurements for the characterization of nutritional status. *Human Biology* 28: 111, 1956.
- \_\_\_\_\_. Physiology of Lactation. World Health Organization. Tech. Rept. Ser., no. 305, 12, 1965.
- \_\_\_\_\_. The influence of breastfeeding on the incidence of infectious illness during the first year of life. A report of the Research Sub-committee of the South-East England faculty of the Royal College of General Practitioner. *Practitioner London* 209: 356, 1972.

## Appendix I

An Investigation on  
Infant and Child Feeding and Weaning Practices and Health  
Attitudes in Rural Haiti

HNF - VPI & Su

Ma. Stella V. Gonzales, M. D.





- a) convenient \_\_\_\_\_
  - b) is modern \_\_\_\_\_
  - c) mother has to go to work \_\_\_\_\_
  - d) mother's milk insufficient \_\_\_\_\_
  - e) advised by relative and peers \_\_\_\_\_
  - f) other \_\_\_\_\_
- Specify: \_\_\_\_\_

16. When did you first start bottle feeding?

- a) from birth
- b) 3-6 months
- c) 7-12 months
- d) 13-24 months
- e) 25-36 months

17. How often do you bottle feed the child?

- a) when the child cries \_\_\_\_\_
  - b) alternating with breast feeding \_\_\_\_\_
  - c) other \_\_\_\_\_
- Specify: \_\_\_\_\_

18. What do you bottle feed your child?

- a) milk \_\_\_\_\_
    - whole milk \_\_\_\_\_
    - condensed milk \_\_\_\_\_
    - evaporated milk \_\_\_\_\_
    - powdered milk \_\_\_\_\_
    - other \_\_\_\_\_
- Specify: \_\_\_\_\_
- b) fresh fruit juice \_\_\_\_\_
 

specify kind of juice: \_\_\_\_\_
  - c) Other \_\_\_\_\_ Specify: \_\_\_\_\_

19. How do you clean the bottle?

- a) with boiling water \_\_\_\_\_
  - b) with cold water \_\_\_\_\_
  - c) with water and soap \_\_\_\_\_
  - d) other \_\_\_\_\_
- Specify: \_\_\_\_\_

20. Why did you choose not to breast feed your child

- a) didn't want to start \_\_\_\_\_
- b) couldn't (but wanted to) \_\_\_\_\_
- c) baby would not suck \_\_\_\_\_
- d) advised against it \_\_\_\_\_
- e) mother has to go to work \_\_\_\_\_

Who, if anyone, advised the mother not to breast feed?

- a) relative \_\_\_\_\_
- b) neighbor/friend \_\_\_\_\_
- c) other \_\_\_\_\_

21. At what age do you wean the child?

- a) 3-6 months
- b) 7-12 months
- c) 13-18 months
- d) 17-24 months
- e) 25-36 months

22. Reasons for weaning

- a) mother is ill \_\_\_\_\_
- b) mother needs to work \_\_\_\_\_
- c) child refuses to suck \_\_\_\_\_
- d) child is ill \_\_\_\_\_
- e) another pregnancy \_\_\_\_\_
- f) social reasons \_\_\_\_\_
- g) other \_\_\_\_\_ Specify \_\_\_\_\_

23. What special practice do you use to wean the child?

- a) none \_\_\_\_\_
- b) bush tea \_\_\_\_\_
- c) bush tea and purgative \_\_\_\_\_
- d) lemon and linseed \_\_\_\_\_
- e) sleep away from mother \_\_\_\_\_
- f) geographical separation \_\_\_\_\_
- g) other \_\_\_\_\_ Specify: \_\_\_\_\_

24. If she were to have another baby, would she breast feed again?

- yes \_\_\_\_\_ it depends \_\_\_\_\_
- no \_\_\_\_\_ don't know \_\_\_\_\_

If no, why not?

- a) baby's health \_\_\_\_\_
- b) need to go to work \_\_\_\_\_
- c) inconvenient for mother \_\_\_\_\_
- d) mother's figure \_\_\_\_\_
- e) husband's preference \_\_\_\_\_
- f) relatives preference \_\_\_\_\_
- g) other \_\_\_\_\_ Specify \_\_\_\_\_

25. When were/will liquids or semi-solid foods first introduced?

- a) less than 3 months \_\_\_\_\_
- b) 3-6 months \_\_\_\_\_
- c) 7-12 months \_\_\_\_\_

- d) 13-18 months \_\_\_\_\_  
 e) when child had its first tooth \_\_\_\_\_  
 f) when child started to refuse the bottle or breast milk \_\_\_\_\_

26. What are these foods?

- a) gruel \_\_\_\_\_ Specify \_\_\_\_\_  
 b) vegetable soup \_\_\_\_\_  
 c) mashed yam \_\_\_\_\_  
 d) boiled potato \_\_\_\_\_  
 e) boiled cassava \_\_\_\_\_  
 f) egg \_\_\_\_\_  
 g) special commercial food \_\_\_\_\_ Specify \_\_\_\_\_  
 h) soft portion of family meal \_\_\_\_\_

27. Who suggested that you use these foods?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

28. Do you prepare a special weaning food for the child? yes\_\_\_ no\_\_\_

If yes, name the food \_\_\_\_\_

29. At what age does the child eat entirely from the family pot?

- a) 6-12 months \_\_\_\_\_ c) 19-24 months \_\_\_\_\_  
 b) 13-18 months \_\_\_\_\_ d) other reasons \_\_\_\_\_

30. Who cooks the family food?

- a) mother \_\_\_\_\_  
 b) grandmother \_\_\_\_\_  
 c) older daughter \_\_\_\_\_  
 d) bought from the store already cooked \_\_\_\_\_

31. How do you feed the child?

- a) feed it with your hand \_\_\_\_\_  
 b) feed it with a spoon \_\_\_\_\_  
 c) teach it how to eat by itself \_\_\_\_\_

32. Where do you get your water?

- a) faucet \_\_\_\_\_ c) spring \_\_\_\_\_  
 b) deep well \_\_\_\_\_ d) river \_\_\_\_\_

\_\_\_\_\_  
 (Mother's attitudes and practices during pregnancy and lactation)

33. Do you need special care during pregnancy? yes \_\_\_\_\_ no \_\_\_\_\_  
If yes, specify what kinds of special care needed.

---

34. Why do you feel you need this special care

- a) they were given by the health personnel (Dr., Nurse) \_\_\_\_\_  
b) it was advised by a friend or relative \_\_\_\_\_  
c) I heard on the radio that it was good \_\_\_\_\_

35. Do you eat any special food during pregnancy and while breast feeding?

yes \_\_\_\_\_ no \_\_\_\_\_

If yes, ask the mother to name the food \_\_\_\_\_

36. Why do you eat these special foods?

---



---

37. Do you avoid certain foods during pregnancy and lactation? yes \_\_\_\_\_ no \_\_\_\_\_

If yes, what foods do you avoid during these periods?

---



---

38. Why do you avoid these foods?

---



---



---



---

(Mother's attitudes toward health practices)

39. Has your child ever had trouble with these conditions?

- a) frequent colds \_\_\_\_\_  
b) soft stool (not watery) \_\_\_\_\_  
c) abdominal pains \_\_\_\_\_  
d) lack of appetite \_\_\_\_\_  
e) excessive appetite \_\_\_\_\_  
f) night blindness \_\_\_\_\_  
g) other \_\_\_\_\_

---

40. When your child is sick, do you seek treatment for the child?  
 yes \_\_\_\_\_ no \_\_\_\_\_

If yes, where do you get treatment for the child?

- a) health clinic \_\_\_\_\_
- b) self-medication \_\_\_\_\_
- c) advise of relatives \_\_\_\_\_
- d) quack doctor \_\_\_\_\_

41. When did you first notice your child was not well?

- a) since birth \_\_\_\_\_
- b) between birth and weaning \_\_\_\_\_
- c) during the period of weaning \_\_\_\_\_
- d) after the child was weaned \_\_\_\_\_

42. What do you think causes sickness in children?

- a) disease \_\_\_\_\_
- b) evil spirit \_\_\_\_\_
- c) normal process of child growth \_\_\_\_\_
- d) other \_\_\_\_\_ Specify \_\_\_\_\_

43. Do your children use a toilet?

- a) don't have a toilet \_\_\_\_\_
- b) they are afraid to use the toilet \_\_\_\_\_
- c) we share the neighbor's toilet \_\_\_\_\_

(Information on Mother)

44. Age of mother

- a) 15-25 years \_\_\_\_\_
- b) 26-35 years \_\_\_\_\_
- c) 36-45 years \_\_\_\_\_
- d) 46 and over \_\_\_\_\_

45. What is her principal work?

- a) housework alone \_\_\_\_\_
- b) housework and farming \_\_\_\_\_
- c) factory worker \_\_\_\_\_
- d) shop keeper \_\_\_\_\_
- e) domestic (cook, maid) \_\_\_\_\_
- f) market woman \_\_\_\_\_
- g) government employee \_\_\_\_\_

46. What level of schooling has she completed

- a) none \_\_\_\_\_
- b) little, can read and write \_\_\_\_\_
- c) primary schooling completed \_\_\_\_\_
- d) secondary schooling completed \_\_\_\_\_
- e) part secondary schooling completed \_\_\_\_\_

47. How old was she when she had her first baby?

- a) 15-20 years old \_\_\_\_\_
- b) 21-30 years old \_\_\_\_\_
- c) 31-40 years old \_\_\_\_\_

## Part II

## Anthropometry and Clinical Examinations

1. Child's name \_\_\_\_\_

2. Examination number \_\_\_\_\_

## Anthropometry

3. Weight \_\_\_\_\_ lbs. \_\_\_\_\_ oz. \_\_\_\_\_

or

kg. \_\_\_\_\_ . \_\_\_\_\_

4. Height/Length  
(delete one)

or

inches \_\_\_\_\_ . \_\_\_\_\_

cm \_\_\_\_\_ . \_\_\_\_\_

5. Head circumference

cm \_\_\_\_\_ . \_\_\_\_\_

6. Chest circumference

cm \_\_\_\_\_ . \_\_\_\_\_

7. Mid-arm circumference

cm \_\_\_\_\_ . \_\_\_\_\_

8. Triceps Skinfold

mm \_\_\_\_\_

9. Teeth (number erupted

upper \_\_\_\_\_  
lower \_\_\_\_\_

Remarks: \_\_\_\_\_

Do the remarks directly affect anthropometry (e.g., hydrocephalus, missing limb)?  
yes \_\_\_\_\_ no \_\_\_\_\_

## Clinical Examination

(Check unequivocal signs only)

10. Hair: Thin and sparse \_\_\_\_\_  
Proximal dyspigmentation \_\_\_\_\_11. Eyes: Xerosis \_\_\_\_\_  
Keratomalacia \_\_\_\_\_  
Conjunctival pallor \_\_\_\_\_12. Lips: Angular stomatitic \_\_\_\_\_  
Cheilosis \_\_\_\_\_

APPENDIX II. SAMPLE DISTRIBUTION OF MOTHERS ACCORDING TO AGE GROUPS AND LITERACY LEVELS IN RELATION TO THE NUTRITIONAL STATUS OF CHILDREN

N = 228

AGE GROUPS (Years)	LITERATE				ILLITERATE				ALL CHILDREN			
	Nutritional level of Children				Nutritional level of Children				Nutritional level of Children			
	Mod/Severe		Normal/Mild		Mod/Severe		Normal/Mild		Mod/Severe		Normal/Mild	
	N	%	N	%	N	%	N	%	N	%	N	%
15-25	9	45.0	11	55.0	6	21.4	22	78.6	15	31.3	33	68.7
26-35	10	30.3	23	69.7	23	41.9	32	58.1	33	37.5	55	62.5
36-45	6	31.6	13	68.4	6	27.3	16	72.7	12	29.3	29	70.7
46 +	0	0	0	0	2	25.0	6	75.0	2	25.0	6	75.0
Age unknown	0	0	0	0	16	37.2	27	62.8	16	37.2	27	62.8
TOTAL	25	34.7	47	65.3	53	34.0	103	66.0	78	34.2	150	65.8

St. Michael and Lalomas, Haiti      West Indies      July 1973

APPENDIX III. DISTRIBUTION OF SAMPLE CHILDREN IN RELATION TO  
DEGREES OF MALNUTRITION IN BOTH COMMUNITIES

N = 228

COMMUNITIES	Degrees of Malnutrition				TOTAL	
	Moderate/Severe		Normal/Mild		N	%
	N	%	N	%		
St. Michael	45	37.5	75	62.5	120	100
Lalomas	33	30.6	75	69.4	108	100
TOTAL	78	34.2	150	65.8	228	100

St. Michael and Lalomas, Haiti      West Indies      July 1973

$\chi^2 = 1.22$      $df = 1$     (not significant)

APPENDIX IV. MEAN DURATION OF MILK FEEDING AND MEAN AGE FOR INTRODUCTION OF  
SEMI-SOLID FOODS IN BOTH COMMUNITIES

COMMUNITIES	MEAN DURATION OF MILK FEEDING			SEMI-SOLID FEEDING STARTED MEAN AGE AS IN MONTHS
	BREASTFEEDING	BOTTLEFEEDING	MIXEDFEEDING	
ST. MICHAEL	18.20 mos.	21.60 mos.	19.6 mos.	18.8
LALOMAS	15.90 mos.	none	19.0 mos.	17.3

APPENDIX V. NUMBER OF CASES WITH CLINICAL SIGNS IN RELATION TO  
NUTRIENT DEFICIENCIES IN THE TWO COMMUNITIES AT THE  
TIME OF SURVEY

Clinical Signs	Communities	
	St. Michael	Lalomas
1. Vitamin A deficiency		
xerosis	3	0
keratomalacia	1	0
follicular hyperkeratosis	4	11
nyctalopia (night blindness)	11	7
2. Protein deficiency		
thin sparse hair	38	12
proximal dysprigmentation	53	29
bilateral edema	8	0
kwashiorkor	4	0
3. Calories deficiency		
marasmus	4	0
4. Anemia		
conjunctival pallor	97	64
5. Parasitism	55	39
6. Jaundice (yellowish discoloration of the conjunctiva)	11	8
7. Infections		
bilateral adenitis	59	11
scabies	43	25
seborrhic dermatitis	3	5
8. Dentition		
whitish, clean	82	74
with carious teeth	11	12

**The vita has been removed from  
the scanned document**

COMPARATIVE ASSESSMENT OF THE NUTRITIONAL STATUS  
OF HAITIAN CHILDREN DURING THE TRANSITIONAL PERIOD  
IN TWO HAITIAN COMMUNITIES

by

Ma. Stella Gonzales

(ABSTRACT)

The research reported in this study focused on the Ecosystem Approach as the ecological model most appropriate for the study of the nutritional status of pre-school children and the key roles played by the home and family environment. Sample subjects included children in the nutritionally vulnerable years (0-4 years) and their mothers.

The sample consisted of 228 Haitian children, 108 from the community of Lalomas, and 120 from St. Michael. The latter of the two sample areas is considered to be the more progressive of the two. While a Mothercraft Center had been in operation for 8 months in St. Michael, no nutrition education program was available in Lalomas. The short duration in which the Nutrition Center had been in operation prevented measurement of its impact on the community.

Feeding habits, weaning practices, transitional diet, number of siblings in the family, and age and literacy level of the mother were areas investigated in the study. The nutritional status of children was determined via height and weight measurements and comparison to the Stuart's standard.

Over one-third of the children (34.2 percent) were classified as moderately or severely malnourished. Younger children (0-12 months),

and those not yet weaned, evidenced consistently fewer cases of moderate or severe malnutrition. This pattern was apparent in both communities. The transitional diet was found to be characterized by foods readily available in the community, e.g., cassava, plantain and legumes.

It is suggested that future research concentrate on the age composition of the family; specifically, are families composed of several children in the nutritionally vulnerable age category more prone to lower nutritional status than families with only one vulnerable child.